

# EXHIBIT 11

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**Applicant(s) : LG Electronics Inc.**

**COMMISSIONER**



VS024353

[ TITLE OF DOCUMENT ] PATENT APPLICATION

[ RECIPIENT ] Mr. COMMISSIONER

[ DATE OF SUBMISSION ] October 23, 1998

[ TITLE OF INVENTION IN KOREAN ] 평판표시장치, 컴퓨터 및  
평판표시장치의 고정방법

[ TITLE OF INVENTION IN ENGLISH ] Flat display device, Computer, And Method  
for mounting said display device.

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[ PURPORT ] We submit application as above under the article 42 of the Patent Law

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[ REQUEST OF SUBSTANTIVE EXAMINATION ] We request the substantive examination as above under the article 60 of the Patent Law

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[ FEES ]

[ BASIC APPLICATION FEE ]	20 pages	29,000	won
[ ADDITIONAL APPLICATION FEE ]	13 pages	13,000	won
[ PRIORITY FEE ]	0 things	0	won
[ REQUEST FEE ]	40 sections	1,389,000	won
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[ ENCLOSED ] 1. Abstract, Specifications ( & Drawings ) 1 set, each

2. FD duplicates including Duplicates of Application, Abstract, and Specifications ( & Drawings ) 1 set

3. Assignments ( & Translation of the same )

[ DOCUMENT OF ABSTRACT ]

[ ABSTRACT ]

Disclosed are a portable computer which includes a body having an information input device, a memory storage and an arithmetic unit, a case having inner and outer surfaces which covers the body selectively, a display device which displays arithmetic results by the arithmetic unit, and a liquid crystal display device having a back surface coupled with the inner surface of the case.

Further, the present invention provides a portable computer which has a wider display area using a method for coupling the back surface of the liquid crystal display with the inner surface of the case through between the liquid crystal device and the case so as to minimize the non display area of the liquid display device.

[ MAIN FIG ]

FIG. 5

[ SPECIFICATIONS ]

[ NAME OF INVENTION ]

Flat display device, computer, and method for mounting the flat display device

[ BRIEF EXPLANATION OF FIGS ]

Fig.1 show a conventional portable computer,

Fig.2 is an exploded perspective view illustrating a front mounting structure of a liquid crystal display device for the conventional personal notebook computer,

Fig.3 is an exploded perspective view illustrating a side mounting structure of the liquid crystal display device for the conventional personal notebook computer,

Fig.4 (a) is a top view the liquid crystal display device according to the present invention,

Fig.4 (b) is a bottom view illustrating the liquid crystal display device according to the present invention,

Fig.4 (c) is a detailed exploded perspective view of the liquid crystal display device according to the present invention,

Fig.5 is a perspective view illustrating a back mounting structure of the liquid crystal display device for a portable computer according to the present invention,

Fig.6 is a side view illustrating a back mounting structure of the liquid crystal display device according to another embodiment of the present invention,

Fig.7 is a partially cross sectional view illustrating a state that the liquid crystal display device is assembled with a rear case.

**\* Explanation of major parts in the figures \***

10 : body	20 : case
20a : coupling hole	22 : coupling rib
30 : liquid crystal display device	32 : liquid crystal display panel
34 : back light unit	35 : screw hole
37 : fastener	36 : support frame
38 : screw	

**[ DETAILED DESCRIPTION OF INVENTION ]**

**[ OBJECT OF INVENTION ]**

**[ TECHNICAL FIELD OF THE INVENTION AND CONVENTIONAL ART OF THE FIELD ]**

The present invention relates to an image display device for use in a computer, a computer having the image display device and a method of mounting the image display device to the computer.

The computer can be classified into many types such as a laptop computer, a portable computer and the like, and basically has an input device, a memory unit, an arithmetic unit, and an image display device displaying arithmetic results by the arithmetic unit.



As a display device or a monitor, a cathode ray tube (CRT) is usually used for a laptop computer, and a liquid crystal display (LCD) is usually used for a portable computer.

But those classifications become meaningless, since the LCD devices emitting little electromagnetic waves and less harmful to eyes are recently applied to the laptop computers instead of the CRTs, and plasma display panels (PDP) and field emission displays (FED), which are still on developing due to their over-consuming electric power, have a possibility to be applied to portable computers in the near future.

The present invention relates to the image display device which is applicable to the above-mentioned various computers, and especially relates to methods and structures of mounting the display device to the case or the housing in order to maximize the display area of the flat panel display device like the LCD of a flat panel structure.

Under the above-mentioned background, only for the sake of convenience of explanation, the present invention is explained especially centering on the flat panel display devices and the methods of mounting the same which are applied to portable computers required to be small-sized.

Further, though the present invention refers to the LCD as an example of the flat panel display device, the present invention may be applied to various display devices, which will be developed in the future.

Referring to Fig. 1, a typical portable computer such as laptop or notebook computers includes a body 100, a case 120 coupled to the body 100 via a hinge mechanism, and an image display device 130 fixed to the body 100.

The body 100 has a key-input device 110 exposed to the outside as an input device, and has an information processing unit (not shown) mounted inside the body 100 like a memory storage unit, an arithmetic unit and the like. And for the flat panel display device 130, a liquid crystal display device (LCD) is widely used for portable computers or flat screen monitors due to the smaller space occupied by the liquid crystal display device.

An actual back light device includes a light guide, a polarizer and the like which are not shown, and that is the definition of the back light device in this application.

Further, a flat panel display device assembly is defined as a device including the flat panel display device and the case casing the flat panel display device, and a flat panel display device module is defined as the flat panel display device with a support frame and the like mounted in order to be coupled to the case.

Referring to Fig. 2, in an assembly structure of the LCD device applied to a conventional portable computer, the case 120 has a front case 122 and a rear case 124 separated, which can be coupled, so as to fix the LCD device 130.

The rear case 124 has an outer surface and an inner surface, and coupling ribs 124a are formed at the four corresponding positions of the inner surface to support each corner of the LCD 130.

The LCD device 130 has an LCD panel 132 at its front surface, a back light device 134 arranged at the back surface of the LCD panel 132, and a support frame 136 is surrounded along the edges of the back light device 134 and the LCD panel 132. And, the support frame 136 has protrusions 136a located at locations corresponding to the positions of the ribs 123a of the rear case 124.

For mounting the LCD device 130 having the above mentioned structure to the case 120, the LCD device 130 is placed on the rear case 124 so that the protrusions 136a corresponds to the coupling ribs 124a, the support frame 136 and the ribs 123a are fastened together by screws 138, and finally the front case 122 is coupled to the rear case 124.

At this point, as described above, the front mounting method is defined as the method in which the LCD device 130 is mounted to the rear case 124 from the front toward the rear by the screw 138, and the structure assembled through the front mounting method is defined as the front mounting structure.

However, in the front mounting structure of the LCD device 130, there exists a problem that the display area of the LCD device 130 is reduced relatively, since the protrusions 136 protruded from the support frame 136 occupies space corresponding to the width "d" of the protrusion 136a.

To solve the above problem, the application of the side mounting method and the side mounting structure have been suggested recently.

Referring to Fig. 3 which shows the side mounting structure of the LCD device, the case 120 has the front case 122 and the rear case 124 which are removable,

and a couple of coupling holes 124b are formed on each side surface of the rear case 124.

The support frame 136 surrounds the edge of the LCD panel 132 and the back light unit 136, one couple of coupling ribs 134a are respectively protruded from each side of the back light unit 134 corresponding to each position of one couple of connecting holes 124b. And the support frame 136 has sections cut so as not to interfere with coupling ribs 134a, or has holes corresponding to the holes of the coupling ribs 134a for the same reason.

For mounting the LCD device 130 of the above structure, the LCD device is placed at the rear case 124, the coupling holes 124b and the coupling ribs 134a are fastened by the screws 138, and the rear case 124 is coupled with the front case 122.

In the side mounting method for the LCD device described above, in comparison with the front mounting method, the non-display area may be reduced, since a height "t" of the coupling rib of the back light unit can get smaller than the width "d" of the protrusion of the Fig. 2 by placing the coupling ribs 137 on the side surface. Thus, the side mounting method plays an important role in expanding the display area of the LCD panel 132.

But, the side mounting method also needs the coupling ribs, which produce the non-display area as large as a height "t" of the coupling rib. Thus, the problem of the non-display area still exists.

# [ TECHNICAL SUBJECT OF INVENTION ]

To solve the above problem, the present invention provides a flat panel display device of which the display area is maximized by minimizing the non-display area produced when the flat panel display device is mounted to the case of the flat panel display device, provides a computer having the flat panel display device and a method of mounting the flat panel display device on the computer.

# [ CONSTRUCTION AND OPERATION OF INVENTION ]

To achieve the above purpose, the present invention basically provides a method for coupling a rear surface of a flat panel display device with a front surface of a case or a housing which receives the flat panel display device, and the flat panel display device mounted by the method.

In one aspect, the present invention provides a portable terminal which includes a body having a key input device and an arithmetic unit, a case having inner and outer surfaces and selectively covering the body, a liquid crystal display device having a front surface displaying arithmetic results of the arithmetic unit and a back surface coupling with the inner surface of the case.

In another aspect, the present invention provides a computer including an input device; an information processing unit; a flat panel display device having a front surface displaying results of the information processing unit and a back surface having a first fastening portion; and a case having a second fastening portion located on a

location corresponding to the first fastening portion and receiving the flat panel display device.

In another aspect, the present invention provides a liquid crystal display device module of a LCD device coupled with the outside members, the liquid crystal display module including a liquid crystal display panel; a back light device providing light wave for the liquid crystal display panel, having a front surface coupled with a rear surface of the LCD panel and a rear surface having a coupling means coupled with the outside members; a support frame supporting and coupling the flat panel display device and the back light device.

In another aspect, the present invention provides a flat panel display device assembly for a computer, including a flat panel display device displaying arithmetic results of the information processing unit; and a case having a front surface coupled with a rear of the flat panel display device.

In another aspect, the present invention provides a method of mounting a flat panel display device having a front surface displaying the processing results of an information processing unit of a computer and a back surface, the method including: preparing a case receiving the flat panel display device; forming a first fastening portion in the case; forming a second fastening portion in the back surface of the flat panel display device, the second fastening portion located at a location corresponding to the first fastening portion of the case; aligning the first fastening portion of the case with to the second fastening portion of the flat panel display device; and fixing the flat panel display device to the case.

In the present invention, as the flat panel display device PDP or FED device may be applicable, but the LCD device is preferred.

In fixing the LCD device to the portable computer, since the assembling section is at the rear surface, the area of the edge is reduced so as to minimize the non-display area. Thus, the display area of the LCD device becomes wider.

Hereinafter, a preferred embodiment of the present invention will be described in detail by way of example of a computer and a LCD device as a flat panel display device of the computer. The examples are for the purpose of the convenient explanation.

Fig. 4a and 4b are front and back views showing the LCD device, respectively, according to a first embodiment of the present invention.

The LCD device 30 includes a LCD panel 32 and a back light device stuck to the rear surface of the LCD panel 32. A support frame 36 is formed along edges of the back light device 34 and the LCD panel 32 so as to support and couple them. A plurality of screw holes 35 are formed on the rear surface of the back light device 34. Preferably, the screw holes 35 are formed on each corner for more stable fixing. Since in a real LCD device a printed circuit board 31 is protruded from the rear surface of the back light device 34, the support frame 36 has the structure to cover the thickness of the printed circuit board. Thus, though the screw holes 35 are formed on the corners and may have the same height in a rib type, the screw holes 35 prefer not to exceed the width of the support frame 36.

Fig. 4 (c) is a detailed exploded perspective view of the liquid crystal display device shown in Fig. 4 (a) and 4 (b). Illustrated in the Fig 4 (c), the LCD device has a

first fixing frame 34g, a reflector 34f, light guide 34e, a diffuser or a protection sheet 34d, a first prism sheet 34c, a second prism sheet 34b, a diffuser or a protection sheet 34d and a LCD panel 32, which are stacked sequentially. The first fixing frame 34g is coupled with the second fixing frame located at the upper portion of the LCD panel 32. Therein, screw holes 35 are formed at each corner of the first fixing frame 34g.

This embodiment of the present invention does not define or specify the figure and composition of the panels used in the back light device 34 of the LCD device. Each panel and the fixing frame are changeable, and some of them can be omitted. The point of the embodiment is the connecting part formed at the back surface of the LCD device, as the screw holes 35.

Fig. 5 is an exploded perspective view of assembling the LCD device shown in Figs. 4 a, 4 b, and 4c to a case of a portable computer.

Shown in Fig. 5, the portable computer includes a body 10 having a key input device, a memory storage and an arithmetic unit; a case 20 having inner and outer spaces and alternatively covering the body 10 via a hinge mechanism; and a display device 30 displaying arithmetic results of the arithmetic unit and fixed into the case 20.

Coupling holes 20a are formed on the inner surface of the case 20.

For mounting the LCD device 30 to the case 20, the LCD device 30 is placed into the case 20 with the coupling holes 20a corresponding to the coupling member 35, and the case 20 and the LCD device 30 are fastened by screws 38.

At this point, the coupling hole 20a has a stepped hole shape so as for the head of the screw 38 not to protrude out of the case 20.



Not shown in the Fig., for the sake of appearance, the front case 122 like part shown in the Fig. 3 covers the edge of the LCD device 30 and connects the case 20, preferably the same as the conventional structure.

Fig. 6 is a side view of another embodiment of the present invention, showing the LCD device having an assembling structure at the rear.

Fig. 7 is a partially sectional perspective view of the connections shown in Fig. 6 in detail.

The LCD device 30 is mounted to the case by fixing the fasteners 37 of plastic hooks, which are protruded from the rear surface of the back light device 34, to the fixing ribs 22 formed on the case 20. Exaggerated in the Fig., the coupling ribs 22 and the fasteners 37 actually have the same shape as the coupling member 35 of the first embodiment, and preferably formed so as not to exceed the width of the support frame 36 preferably.

A coupling hole 20b for fastener 37 is formed on the coupling rib 22. The coupling hole 20b is preferably a through-hole extending all the way to the outer surface of the case 20 for disassembling. The coupling hole 20b has a stepped hole shape so as for the head of the fastener 37 to be latched.

The fastener 37 has a compressible head which compresses into a small diameter to allow the fastener to enter and slide through the coupling hole 20b. Once the head reaches the stepped portion, the head returns to its original diameter and snaps or latches onto the stepped portion of the fixing rib 22. In order to disassemble or release the LCD device 30 from the case 20, a pair of tweezers or similar tool can be

used in compressing the head of the fastener 37 from the back of the case 20 through the hole 20b. The fastener 37 is unlatched and can freely slide out of the hole 20b.

For the sake of appearance, a cover or a sticker 20c is preferably used in covering the coupling hole 20b from the outside of the case 20.

The assembly of the LCD device 30 and the case 20 of this embodiment has the benefit of simplicity and convenience.

However, in order to form the plastic hooks, namely, the fastener on the inner surface of the case with the fixing rib formed on the rear surface of the back light device is also possible.

#### [ EFFECT OF INVENTION ]

In the above mounting method according to the present invention, the LCD device is connected with the rear of the case so as to minimize the non-display area of the flat panel display device. Thus, the ratio of the display area of the LCD device to the display case can be improved and maximized.

It will be apparent to those skilled in the art that various modifications and variation can be made in the portable computer and method for mounting a flat panel display device thereon of the present invention without departing from the spirit or scope of the invention. For example, instead of the LCD device, various flat panel display devices may be used, and for back mounting assembly a strong velcro may be used on the inner surface of the case and the back of the back light device. A snap

button of thin steel plate using elasticity is applicable to the back light device and the case, too.

Further, the present invention is applicable to lap-top computers as well as portable computers.

But, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.



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[ RANGE OF CLAIMS ]

[ CLAIM 1 ]

A portable computer comprising:

a body including an input device and an information processing unit;

a case having an inner surface and an outer surface, and covering the body selectively;

and a flat panel display device including a display portion showing results of the information processing unit, and a back surface coupled to the inner surface of the case.

[ CLAIM 2 ]

The portable computer according to the claim 1, wherein

the flat panel display device is a liquid crystal display device.

[ CLAIM 3 ]

The portable computer according to the claim 2, wherein

the liquid crystal display device includes a liquid crystal display panel, a back light device and a support frame supporting the liquid crystal display panel and the back light device.

[ CLAIM 4 ]

The portable computer according to the claim 1 further comprising

another case coupled with edge portions of the case toward the display portion of the flat panel display device.

[ CLAIM 5 ]

The portable computer according to the claim 1, wherein

at least one coupling member including an internal screw is fixed on the back surface of the flat panel display device is fixed, at least one coupling hole formed on the case corresponding to a position of the coupling member, and the coupling hole and the coupling member are fastened by a screw.

[ CLAIM 6 ]

The portable computer according to the claim 5, wherein

the flat panel display device is a liquid crystal display device.

[ CLAIM 7 ]

The portable computer according to the claim 5, wherein

each coupling member is formed at each corner of the back surface of the flat panel display device.

[ CLAIM 8 ]

The portable computer according to the claim 1, wherein

at least one fastener is formed on the back surface of the flat panel display device toward the case, and at least one stepped coupling hole is formed on the case corresponding to the fastener.

[ CLAIM 9 ]

The portable computer according to the claim 8, wherein  
the fasteners is formed around corners of the back surface of the flat panel display device.

[ CLAIM 10 ]

The portable computer according to the claim 8, wherein  
the flat panel display device is a liquid crystal display device.

[ CLAIM 11 ]

The portable computer according to the claim 1, wherein  
the case is coupled to the body via a hinge mechanism.

[ CLAIM 12 ]

As a flat panel display device used with an outside member coupled,  
a flat panel display device module comprising:  
a flat panel;

a back light device providing light wave to the flat panel, coupled with a rear surface of the flat panel, and including a coupling means which is coupled with the outside member;

and a support frame supporting and coupling the flat panel and the back light device.

[ CLAIM 13 ]

The flat panel display device module according to the claim 12, wherein

the flat panel is a liquid crystal display panel.

[ CLAIM 14 ]

The flat panel display device module according to the claim 12, wherein

the coupling means is at least one fastener coupled with a rear surface of the back light device.

[ CLAIM 15 ]

The flat panel display device module according to the claim 12, wherein

the coupling means is at least one coupling member including an internal screw in an inner portion.

[ CLAIM 16 ]

The flat panel display device module according to the claim 12, 13, 14, or 15 wherein

the outside member is a case of a portable computer.



[ CLAIM 17 ]

As a flat panel display device used with an outside member coupled, a flat panel display device module comprising:

a flat panel including a display portion and a back surface;

a flat panel frame supporting the back surface, and including a coupling means which can be coupled to the outside member at a back surface of the flat panel frame;

a support frame supporting and coupling the flat panel and the flat panel frame.

[ CLAIM 18 ]

The flat panel display device module according to the claim 17, wherein

the coupling means is at least one fastener coupled to a rear surface of the support frame.

[ CLAIM 19 ]

The flat panel display device module according to the claim 17, wherein

the coupling means is at least one screw hole.

[ CLAIM 20 ]

The flat panel display device module according to the claim 17, 18, or 19 wherein

the outside member is a case of a portable computer.

[ CLAIM 21 ]

The flat panel display device module according to the claim 17, wherein  
the flat panel is a liquid crystal display panel.

[ CLAIM 22 ]

A flat panel display device used with an outside member coupled comprising:  
a flat panel including a display portion and a back surface;  
a light guide placed adjacent to the back surface of the flat panel;  
a reflector placed adjacent to the back surface of the light guide;  
a first frame supporting and coupling the flat panel and the light guide and the  
reflector;

a second frame including a coupling means on a back surface, and the coupling  
means coupled with the first frame so as to be coupled with the outside member.

[ CLAIM 23 ]

The flat panel display device according to the claim 22, wherein

At least one diffuser, at least one protection sheet and at least one prism sheet are  
placed between the reflector and the light guide.

[ CLAIM 24 ]

The flat panel display device according to the claim 22, wherein

the coupling means is at least one fastener coupled with a rear surface of the support frame.

[ CLAIM 25 ]

The flat panel display device according to the claim 22, wherein  
the coupling means is at least one screw hole.

[ CLAIM 26 ]

The flat panel display device according to the claim 22, 23, 24, or 25 wherein  
the outside member is a case of a portable computer .

[ CLAIM 27 ]

The flat panel display device according to the claim 22, 23, 24, or 25 wherein  
the flat panel is a liquid crystal display panel.

[ CLAIM 28 ]

A computer comprising:  
  
an input device;  
  
an information processing unit;  
  
a flat panel display device including a display portion displaying results of the  
information processing unit, and a back surface having a first fastening portion;

a case including a second fastening portion correspondingly coupled with the first fastening portion of the back surface of the flat panel display device, and receiving the flat panel display device.

[ CLAIM 29 ]

The computer according to the claim 28, wherein

the flat panel display device includes a liquid crystal display panel and a back light device, and the case is coupled with a rear surface of the back light device.

[ CLAIM 30 ]

The computer according to the claim 28, wherein

the first fastening portion is at least one coupling member including an internal screw and fixed on the rear surface of the back light device, at least one coupling hole is formed on the case corresponding to a position of the coupling portion, and the coupling hole and the coupling portion are fastened by a screw.

[ CLAIM 31 ]

The computer according to the claim 28, wherein

the first fastening portion is at least one fastener formed from the rear surface of the back light device to the case, and the second fastening portion is a coupling hole formed on a position corresponding to a position of the first fastening portion, the coupling hole has a stepped hole shape for the fastener to be coupled with.

[ CLAIM 32 ]

For a computer including a body having an input device and an information processing unit, a case having an inner surface and an outer surface and covering the body selectively, and a flat panel display device having a display part showing results of the information processing unit and a back surface coupled with the inner surface of the case,

a method of mounting the flat panel display device to the case comprising:

forming a first fastening portion at the case;

forming a second fastening portion at the back surface of the flat panel display device corresponding to the first fastening portion of the case;

and coupling an inner surface of the flat panel display device with a back surface of the case.

[ CLAIM 33 ]

The method of mounting the flat panel display device for the computer according to the claim 32, wherein

the flat panel display device includes a liquid crystal display panel and a back light device, and the case is coupled with a back surface of the back light device.

[ CLAIM 34 ]

The method of mounting the flat panel display device for the computer according to the claim 33, wherein

the first fastening portion is at least one bolt hole formed on the case,

the second fastening portion is at least one screw hole formed on a position corresponding to a position of the bolt hole,

and when coupling the case with the flat panel display device, the flat panel display device and the case are aligned so as for the bolt hole to be corresponding to the coupling portion, and the case is fixed to the flat panel display device by screws.

[ CLAIM 35 ]

The method of mounting the flat panel display device for the computer according to the claim 33, wherein

the first fastening portion is at least one fixing rib having a stepped through hole,

the second fastening portion is at least one fastener formed at a position corresponding to a position of the fixing rib toward the case,

the step of coupling comprises placing the flat panel display device and the case with the fastener corresponding to the coupling portion, and fixing the flat panel display device to the case by pushing the flat panel display device toward the case.

[ CLAIM 36 ]

The method of mounting the flat panel display device for the computer according to the claim 32 further comprising

coupling another case toward the display part of the flat panel display device with edge portions of the case coupled with the flat panel display device.

[ CLAIM 37 ]

A method of mounting a flat panel display device including a display part displaying results of the information processing unit and a back surface, comprising:

preparing a case receiving the flat panel display device;  
forming a first fastening portion at the case;  
forming a second fastening portion at the back surface of the flat panel display device corresponding to the first fastening portion of the case;  
placing the first fastening portion of the case corresponding to the second fastening portion of the flat panel display device;  
and fixing the flat panel display device to the case.

[ CLAIM 38 ]

The method of fixing the flat panel display device according to the claim 37,  
wherein

the flat panel display device includes a liquid crystal display panel and a back light device, and the case is connected with a back surface of the back light device.

[ CLAIM 39 ]

The method of fixing the flat panel display device according to the claim 38,  
wherein

the first fastening portion is at least one bolt hole formed on the case,

the second fastening portion is at least one screw hole corresponding to the bolt hole,

and at the step of coupling the flat panel display device is fixed to the case by screws.

[ CLAIM 40 ]

The method of fixing the flat panel display device according to the claim 38,  
wherein

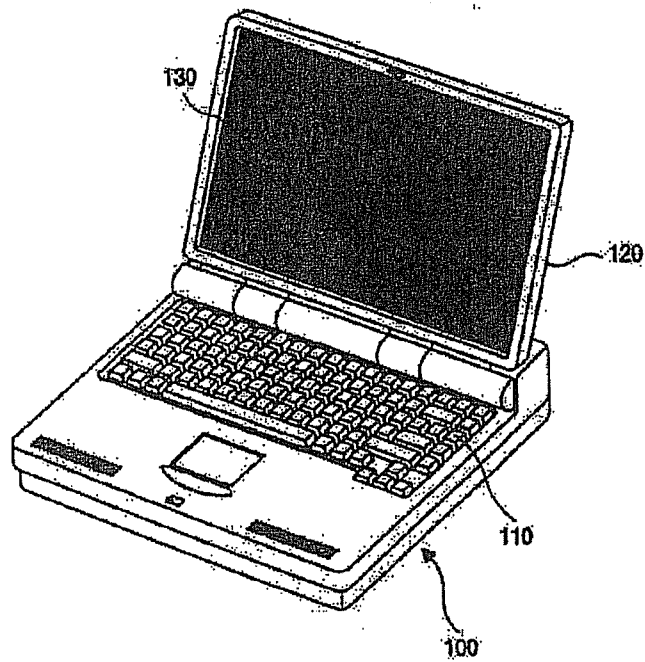
the first fastening portion is at least one fixing rib having a stepped through hole,

the second fastening portion is at least one fastener formed at a position  
corresponding to a position of the fixing rib toward the case,

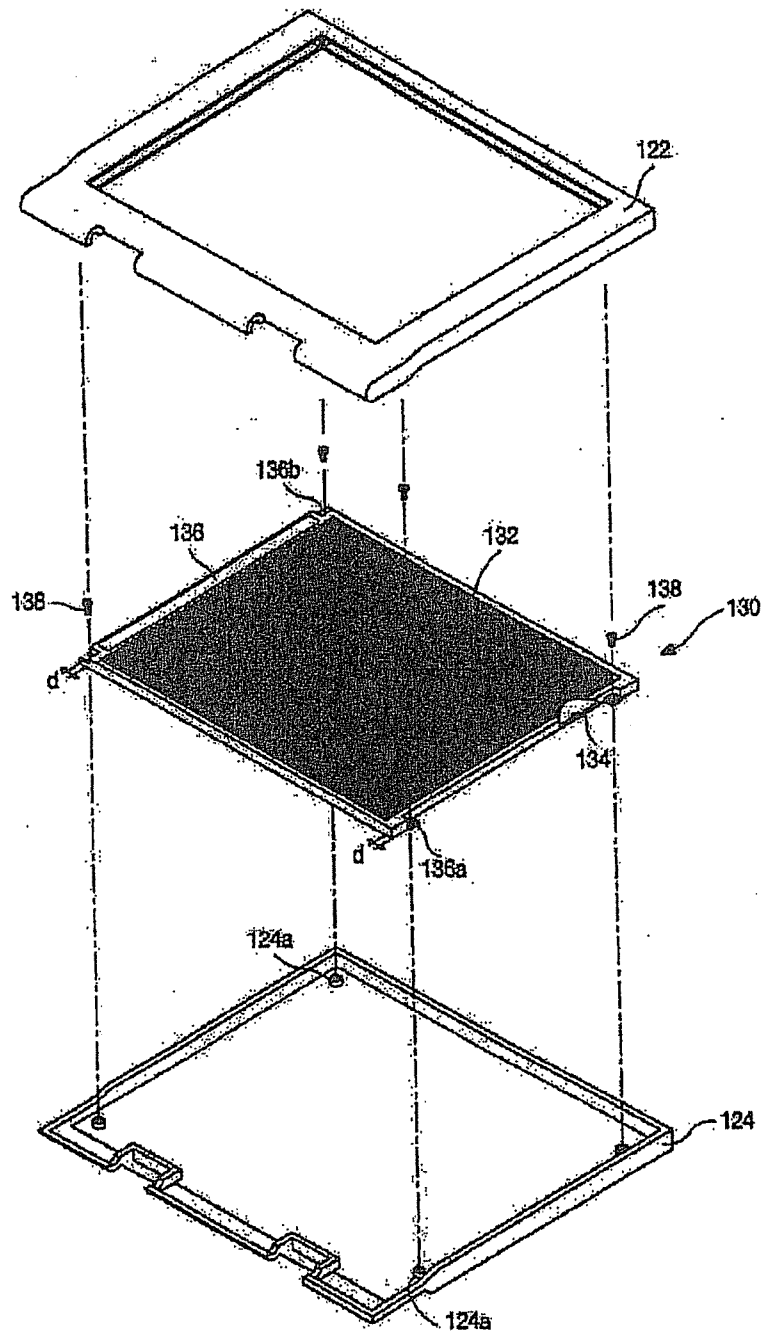
the step of coupling the case with the flat panel display device comprises placing  
the flat panel display device and the case with the fastener corresponding to the connecting  
part, and fixing the flat panel display device to the case by pushing the flat panel display  
device toward case.



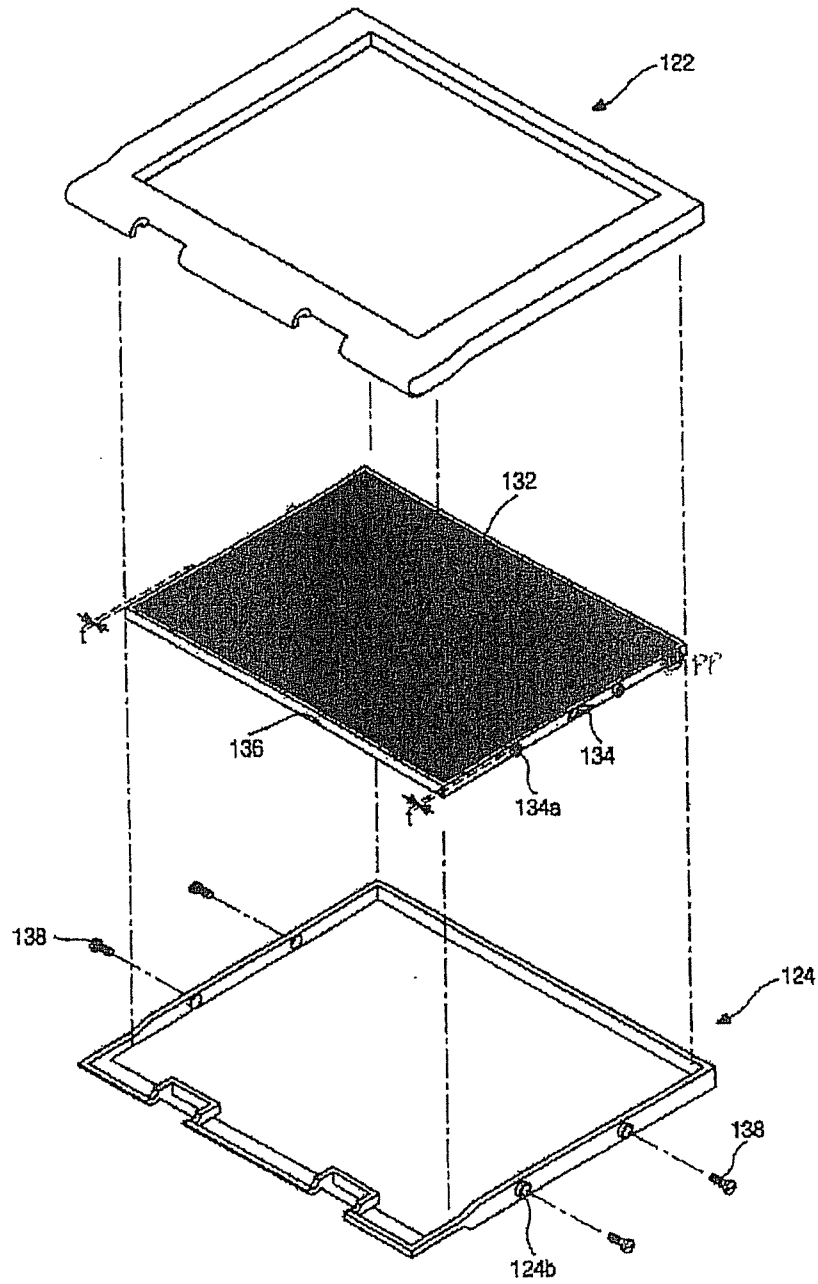
[FIG. 1]



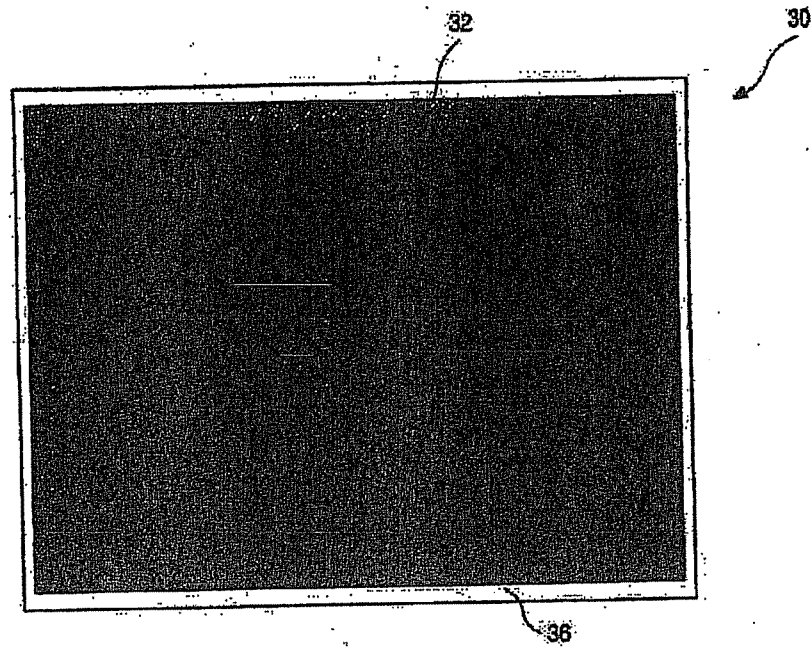
[FIG. 2]



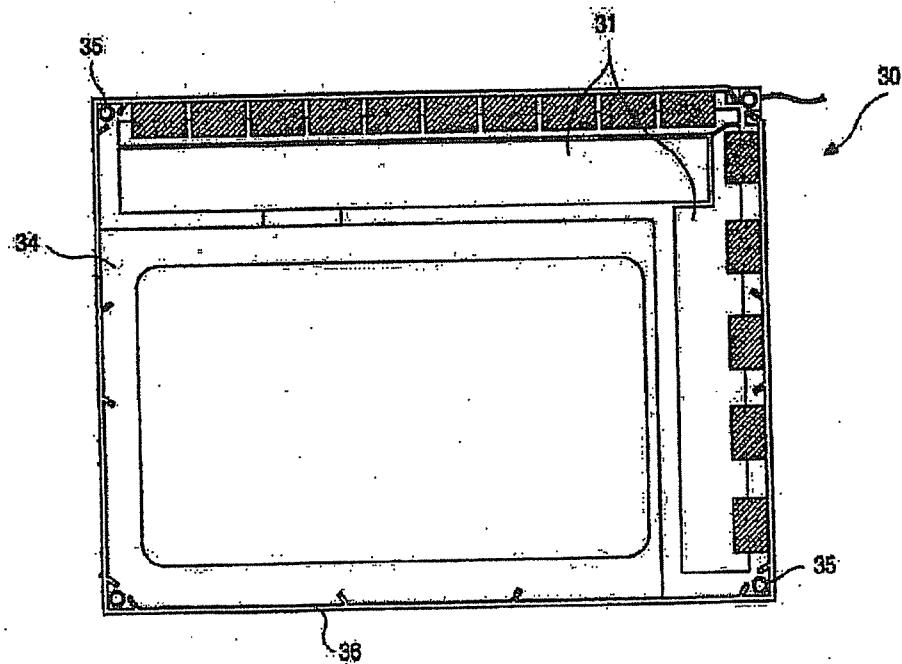
[FIG.3]



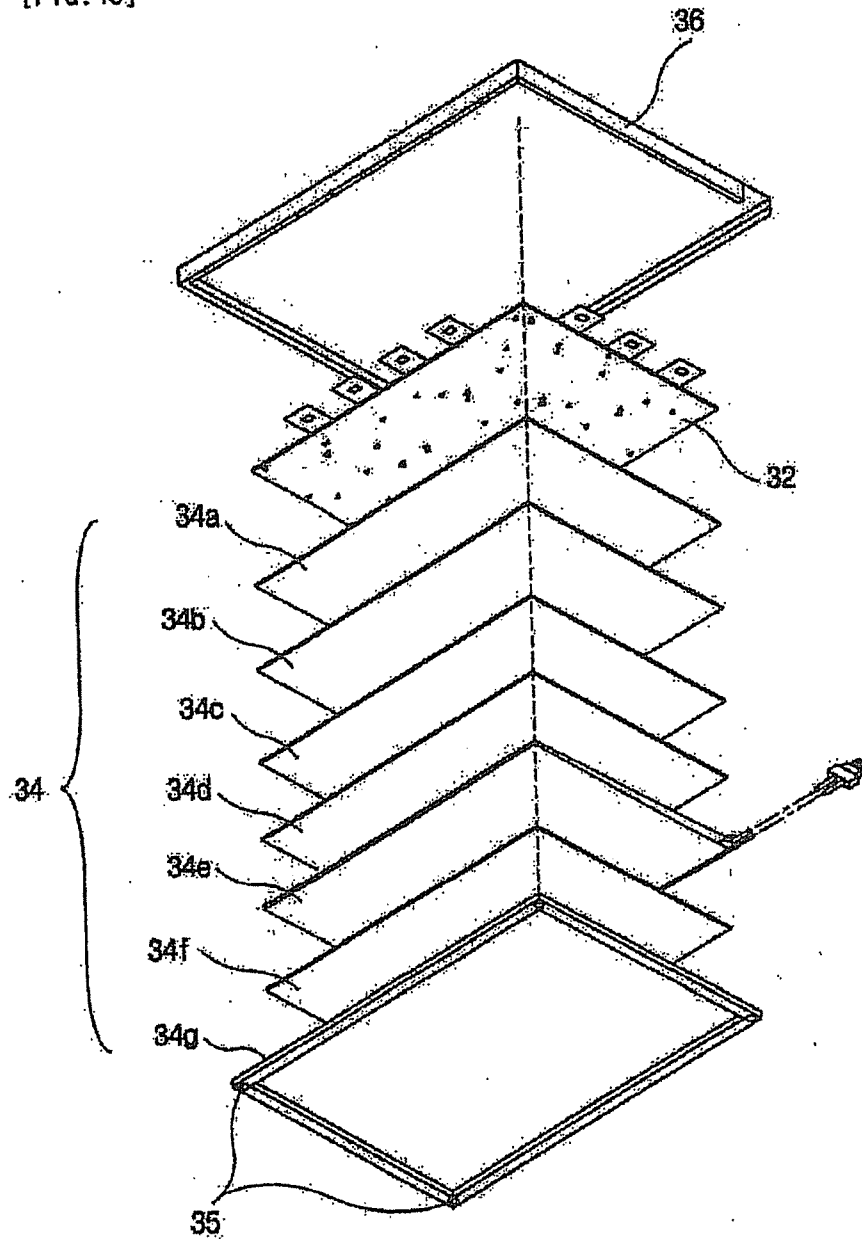
[FIG. 4A]



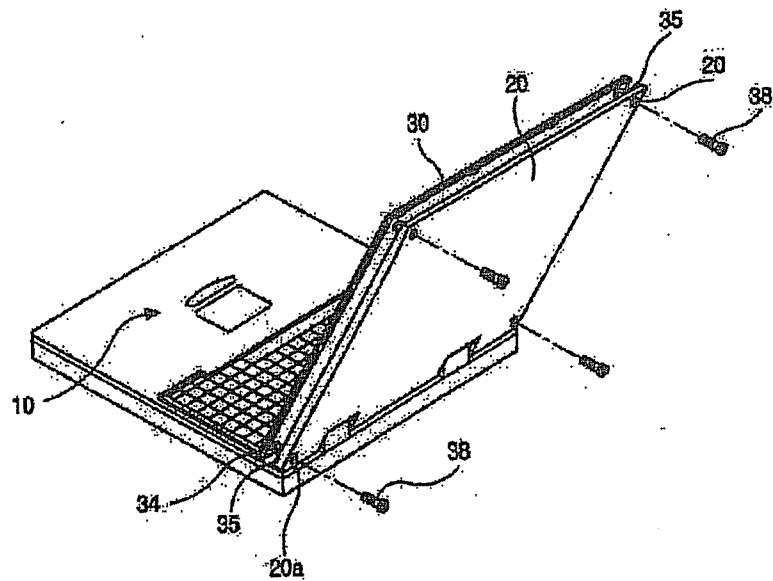
[FIG. 4B]



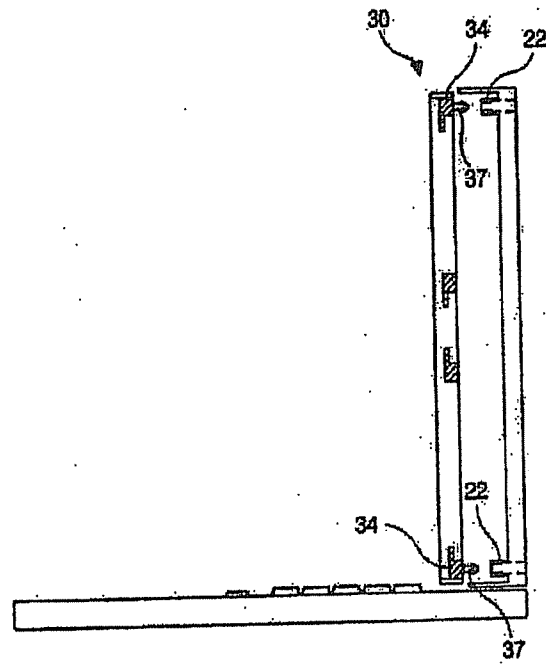
[FIG. 4C]



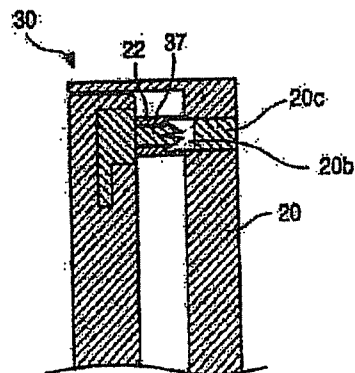
[FIG. 5]



[FIG. 6]



[FIG. 7]



# EXHIBIT 12



**KOREAN INDUSTRIAL  
PROPERTY OFFICE**

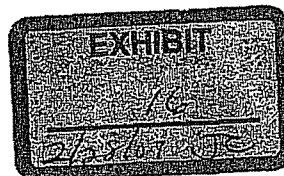
This is to certify that the following application annexed hereto  
is a true copy from the records of the Korean Industrial Property Office

**Application Number : Patent Application 1998 year No. 44973**

**Date of Application : October 27.1998**

**Applicant(s) : LG Electronics Inc.**

**COMMISSIONER**



VS024425

[ TITLE OF DOCUMENT ] PATENT APPLICATION

[ RECIPIENT ] Mr. COMMISSIONER

[ DATE OF SUBMISSION ] October 27,1998

[ TITLE OF INVENTION IN KOREAN ] 휴대용 컴퓨터와 그 평판 표시  
장치의 결합방법

[ TITLE OF INVENTION IN ENGLISH ] A portable computer and the method for  
mounting a flat panel display device thereon

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[ PURPORT ] We submit application as above under the article 42 of the Patent Law

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[ REQUEST OF SUBSTANTIVE EXAMINATION ] We request the substantive examination as above under the article 60 of the Patent Law

Attorney

Jung, Won-Ki (seal)

Attorney

Lee, Chang-Hoon (seal)

[ FEES ]

[ BASIC APPLICATION FEE ]	20 pages	29,000	won
[ ADDITIONAL APPLICATION FEE ]	9 pages	9,000	won
[ PRIORITY FEE ]	0 things	0	won
[ REQUEST FEE ]	24 sections	877,000	won
[ TOTAL ]		915,000	won

[ ENCLOSED ] 1. Abstract, Specifications ( & Drawings ) 1 set, each

2. FD duplicates including Duplicates of Application, Abstract, and Specifications ( & Drawings ) 1 set

3. Assignments ( & Translation of the same )

[ DOCUMENT OF ABSTRACT ]

[ ABSTRACT ]

The present invention produces the method for coupling a portable computer engaging rotating means on a back surface rotatively coupling a body case with a display device case, and the method for coupling a flat panel display device of the portable computer. The present invention shows a portable computer and the method for coupling the portable computer, and the portable computer comprising, a body including an input device and an information processing unit; a body case protecting and receiving the body; a flat panel display device including a display portion displaying results of the information processing unit and a back surface having at least one first fastening portion; rotating means including a second fastening portion engaged with the first fastening portion to rotatively couple the flat panel display device with the body; a display device case formed with a third fastening portion coupled with the first fastening portion and/or the second fastening portion so as to adjoin the back surface of the flat panel display device.

[ MAIN FIG ]

FIG. 4

[ SPECIFICATIONS ]

[ TITLE OF INVENTION ]

A portable computer and method for mounting the display device

[ BRIEF EXPLANATION OF FIGS ]

Fig. 1 is a view showing a conventional portable computer,

Fig. 2a is an exploded perspective view illustrating an assembly structure of a liquid crystal display device for the conventional personal notebook computer,

Fig. 2b is a view of the assembly of liquid crystal display device,

Fig. 3a and Fig. 3b are an exploded perspective view and a bottom view, respectively, illustrating the liquid crystal display device according to the present invention,

Fig. 4 is an exploded perspective view illustrating an assembly structure of a liquid crystal display device of a portable computer according to the present invention,

Fig. 5 is an exploded perspective view illustrating an assembly structure of a liquid crystal display device of another embodiment according to the present invention,

Fig. 6 is a partially assembled view illustrating an embodiment of mounting the liquid crystal display device according to the preferred embodiment according to the present invention illustrated in Fig. 5,

Fig. 7 is a view similar to Fig. 6 illustrating another embodiment of the assembly structure of the liquid crystal display device according to the present invention,

Fig. 8 is a side view illustrating a back mounting structure of the liquid crystal display device according to the present invention,

Fig.9 is a partially cross-sectional view illustrating a state that the liquid crystal display device is coupled with a rear case.

\* Explanation of major parts in the figures.\*

10 : liquid crystal display device	12 : liquid crystal panel
14 : back light device	15 : coupling rib
16 : support frame	18 : screw
20 : body case	22 : hinge mount
24 : hinge arm	26 : fixing plate
30 : image display case	40 : fixing frame
41 : gear	42 : fixing pin
43 : arm	

[ DETAILED EXPLANATION OF INVENTION ]

[ OBJECT OF INVENTION ]

[TECHNICAL FIELD OF INVENTION AND CONVENTIONAL ART OF THE FIELD]

The present invention relates to a coupling structure of a case and a flat panel display device of a portable computer, and the method of the same.

A conventional note book computer assembled with a key input device 102 opened to outside for an information input unit comprises a body 100 including an information

processing unit like a memory storage and an arithmetic unit (not shown) inside, a display device assembly coupled with the body 100 by a hinge 124 and including a flat panel display device inside, and a case receiving and protecting these.

Referring to Fig. 2a and 2b illustrating a conventional display device case assembly 110 in detail, a flat panel display device 111 according to the present invention can be applied to a plasma display panels (PDP) and a field emission displays (FED) and preferably a liquid crystal display device. The liquid crystal display device comprises a liquid crystal panel 112 and a back light device (not shown), and a support frame 114 is surrounded along the edges of the liquid crystal panel 112 and the back light device. In this application, a liquid crystal display device module, or a flat panel display device module is defined as the liquid crystal display device having the support frame.

The display device case 122 is coupled with a body case 120 receiving the body, by a hinge. Thus, the display device assembly is selectively opened or closed at the body 100. A hinge mount 124 of the hinge is protruded from an upper portion of the body case, and the body case 120 is connected with the display device case 122 at a hinge mount 124 via a hinge arm 126. Thus, the display device assembly 110 can be rotated for some angle to the body case 120.

From two opposite side surfaces of the support frame 114 of the liquid crystal display device 111 are fixing plates 114a protruded, and on under corner portions are coupling plates formed. On an inner surface of the display device case 122 are a plurality of



coupling ribs 122a formed so as to be coupled to the fixing plates 114a of the liquid crystal display device 111.

Processes of assembling are fixing an edge of the hinge arm 126 to the coupling plate 114b of the support frame 114 by a screw 128 at first, and finally fastening the fixing plate 114a of the support frame 114 with the fixing rib 122a by a screw 128 downward.

However, in the assembling structure of the liquid crystal display device assembly, as shown in Fig.2b, there occurs a distance by the width  $d1$  of the hinge arm 126 between the liquid crystal display device 110 and display device case 122 due to mounting the hinge arm 126 to the liquid crystal display device 110. Further, the coupling plate 114a takes space by the width  $d2$  of the coupling plate due to protruding of the coupling plate 114a from the support frame 136. Subsequently, there exists a problem of reduced display area due to increased non-display area by space  $d1+d2=D$  between the liquid crystal panel 112 and edge portions of the display device case 122.

#### [ TECHNICAL SUBJECT OF INVENTION ]

To solve the above problem, the present invention provides a portable computer and a method of assembling the same, of which the display area is maximized by minimizing the non-display area produced when the flat panel display device is fixed to a hinge and a case.

[ CONSTRUCTION AND OPERATION OF INVENTION ]

To achieve the above purpose, the present invention provides a portable computer having rotating means rotatively coupling a body case with a display device case and engaged to a back surface of the portable computer, and a method of coupling a flat panel display device of the portable computer.

That is to say, the present invention provides a portable computer comprising, a body including an input device and an information processing unit; a body case protecting and receiving the body; a flat panel display device including a display portion displaying results of the information processing unit and a back surface having at least one first fastening portion; rotating means including a second fastening portion engaged with the **first** fastening portion to rotatively couple the flat panel display device with the body; a display device case formed with a third fastening portion coupled with the first **fastening** portion **and/or** the second fastening portion so as to adjoin the back surface of the flat panel display device.

Further, the present invention provides a method of coupling the flat panel display device of the portable computer comprising preparing a body, the flat panel display device, a display device case and rotating means, which rotatively couple a display device case with the flat panel display device; coupling the rotating means to rotatively couple the display device case with the body; coupling the rotating means on the back surface of the flat panel display device; and coupling the rotating means with the display device case.

The rotating means according to the present invention preferably includes a hinge mount and a hinge arm, and one portion of the hinge arm is placed and coupled on the back surface of the flat panel display device.

The present invention prefers applying the liquid crystal display device to the flat panel display device rather than applying PDP or FED device, which may be applicable, too.

In coupling the portable computer with the flat panel display device according to the present invention, since the rotating means are coupled on the back surface of the flat panel display device, non-display area of side surfaces resulted from coupling is minimized.

Hereinafter, referring to Figs. attached in the application, a **preferred** embodiment according to the present invention is explained more in detail.

**Fig.3a** and **Fig.3b** are an exploded perspective view and a bottom view, respectively, illustrating an embodiment of the liquid crystal display device having coupling means on the back surface.

Illustrated in the **Fig.3a**, a liquid crystal display device 10 comprises a liquid crystal panel 12 formed on the **front** surface and a back light device 14 formed on the rear surface.

A support frame 16 is formed along edges of the liquid crystal panel 12 and back light device 14, and supports and couples the liquid crystal panel with the back light device.

The back light device 14 comprises a diffusing or a protecting sheet 14a **diffusing** to display area of the liquid crystal panel 12, first and second prism sheets 14b, 14c condensing rays for some angle, a **diffusing** or a protecting sheet 14d, a light guide 14e and a reflector 14f receiving incident rays horizontally and emitting rays perpendicularly, and a fixing frame 14g, which are mounted sequentially behind the liquid crystal panel 12.

Referring to the Fig.3b, a plurality of fixing holes 15 are formed along the edges of the back surface of the liquid crystal panel. These fixing holes 15 are preferably formed on each corner for stable fixing, and inner screws are preferably formed in each fixing hole. Though the fixing hole 15 has an exaggerated shape of rib in the Fig, the fixing hole may have just a hole shape according to the design of a circuit board on real applications.

Illustrated in the Fig.4, a hinge mount 22 is protruded from a body case 20, and a hinge arm 24 is inserted into the hinge mount 22. That is to say, the hinge arm 24 has a cylindrical bar 24a shape at a first edge so as to be inserted into the hinge mount 22, and a thin plate 24b shape at a second edge so as to be coupled with the back surface of the liquid crystal display device 10. Herein, a fixing pin may be used at an end portion of the cylindrical bar 24a of the hinge arm 24 coupled with the hinge mount 22, so as not to be separated from the hinge mount.

The thin plate portion 24b of the hinge arm may be extended in various methods or arrangements. Fig.4 shows an **embodiment** of the hinge arm 24 including a thin plate 24b having a reversed F shape. Through holes 24c corresponding to the positions of the fixing holes 15 are formed on the end portion of the thin plate 24b. The through hole 24c is a screw hole or a conventional through hole.

However, the display device case 30 has a coupling holes 30a formed on positions corresponding to each position of the through holes 24c of the hinge arm 24 and the fixing holes 15 of the liquid crystal display device 10. The coupling hole 30a also has an internal hole inside. Or the coupling hole may have a stepped hole including a larger outside diameter and a smaller inside diameter so as for a coupling member to be inserted inside.

Processes of assembling the above liquid crystal display device comprise connecting the body case 20 with the display device case 30 by inserting the hinge arm 24 into the hinge mount 30 of the body case 20, placing the liquid crystal display device 10 on the display device case 30 with the hinge arm 24 placed on the display device case, and fastening the liquid crystal display device 10 with the hinge arm 24 and display device case 30 integrally by the screw 18 from the rear surface of the display device case 30, or outside. For fastening by screws, at least one among the holes 15, 24c and 30a needs to have an internal screw. Of course, instead of the screws 18, nails or hooks are possibly used as fastening members. Therein, the internal screw doesn't need to be formed, but each hole needs to have a hole shape corresponding to the fastening member used.

Fig.5 is an exploded perspective view illustrating an assembly structure of a liquid crystal display device of another embodiment according to the present invention.

Illustrated in Fig.5, the hinge arm 24 is inserted into the hinge mount 22 of the body case 20, longitudinally extended and placed along the two opposite side edges of the display device case 30. The display device case 30 has coupling holes 30a on up and down corners so as to be penetrated with the through holes 24c of the hinge arm 24 at the same time.

Thus, the liquid crystal display device 10 and the hinge arm 24 are mounted via the screw 18 at the same time.

This embodiment is different from the embodiment of the Fig.4 in that the fastening force of this embodiment is stronger due to fastening the thin plate 24b of the hinge arm, the case 30 and the back light device 16 of the liquid crystal display device by the coupling members, for example, the screws at one time.

Fig.6 is a partially assembled view easily illustrating an embodiment of mounting the liquid crystal display device according to the preferred embodiment according to the present invention illustrated in Fig.5.

Fig.7 shows an embodiment that the hinge arm which is placed according to the embodiment illustrated in Fig.5 is applied to a portable computer having the hinge mount at the inner surface of the display device case 30.

Illustrated in Fig.7, this portable computer has the hinge mount 22 at the inner surface of the display device case 30, and the cylindrical bar 24a of the first edge of the hinge arm 24 is inserted into the hinge mount 22 with the thin plate 24b of the second edge extended by the size of the liquid crystal display device 10 along the two opposite sides of the inner surface of the display device case 30.

A fixing plate 26 is formed on the body case 20 and connected with an edge of the hinge mount 22. That is to say, the liquid crystal display device 10 and the display device case 30 are able to rotate for some angle to the body case 20 by the hinge arm with the hinge mount 22 and the fixing plate 26.

Illustrated in the Fig., comparing the structure and action of this embodiment with the embodiment of the Fig.5, unless the different positions of the hinge mounts, the methods of assembling the liquid crystal display device or structures for assembly are alike.

Fig.8 and Fig. 9 are side and partially cross-sectional views, respectively, illustrating an embodiment of coupling the liquid crystal display device, the hinge arm, and the display device case with fastener.

Herein, at least one fastener 19 is formed on the back surface of the liquid crystal display device. The through hole 24c is formed on the thin plate 24b of the hinge arm 24, and a fastener coupling hole 30b is formed on the case 30. The fastener coupling hole 30b is preferably a through hole penetrating the case 30, that is needed on separation. A stepped portion is formed at the coupling hole 30b to latch the head of the fastener 19. The fastener 19 can be compressed when entering the coupling hole 30b so as to be latched at the stepped portion and fixed.

In order to disassemble or release the liquid crystal display device 10 from the case 30, a pair of tweezers or similar tool can be used in compressing the head of the fastener 19 from the back of the case 30 through the hole 30b. The fastener 19 is unlatched and can freely slide out of the hole 30b.

For the sake of appearance, a cover or a sticker is preferably used in covering the coupling hole 30b from the outside of the case 30.

#### [ EFFECT OF INVENTION ]

In the above mounting method according to the present invention, the liquid crystal display device is coupled with the rear of the case so as to minimize the non-display area of the flat panel display device. Thus, the ratio of the display area of the liquid crystal display device to the display case can be improved.

It will be apparent to those skilled in the art that various modifications and variation can be made in the portable computer and method for mounting a flat panel

display device thereon of the present invention without departing from the spirit or scope of the invention. For example, instead of the liquid crystal display device, various flat panel display devices may be used. And, for coupling the case with the body, instead of the hinge, various rotating means, for example, gears may be used.

But, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.



[ RANGE OF CLAIMS ]

[ CLAIM 1 ]

A portable computer comprising:

a body including an input device and an information processing unit;

a flat panel display device including a display portion displaying results of the information processing unit, and a back surface;

a hinge for rotatively coupling the flat panel display device with the body, including a hinge mount and a hinge arm, the hinge arm inserted into the hinge mount and coupled with the back surface of the flat panel display device.

[ CLAIM 2 ]

The portable computer according to the claim 1, wherein

the flat panel display device is a liquid crystal display device.

[ CLAIM 3 ]

The portable computer according to the claim 2, wherein

the hinge arm is formed integrally with a pin for rotation and a thin plate, the thin plate extended on the back surface of the liquid crystal display device.

[ CLAIM 4 ]

A portable computer comprising:

a body including an input device and an information processing unit;

a body case protecting and receiving the body;

a flat panel display device including a display portion displaying results of the information processing unit, and a back surface having at least one first fastening portion;

a hinge for rotatively coupling the flat panel display device with the body, including a hinge mount and a hinge arm, the hinge arm coupled into the hinge mount and coupled with a second fastening portion, the second fastening portion coupled with the first fastening portion;

at least one display device case including a third fastening portion, the third fastening portion coupled with the first fastening portion and/or the second fastening portion so as to adjoin the back surface of the flat panel display device.

**[ CLAIM 5 ]**

The portable computer according to the claim 4, wherein

the flat panel display device is a liquid crystal display device.

**[ CLAIM 6 ]**

The portable computer according to the claim 5, wherein

the hinge arm is formed integrally with a pin, the pin inserted into the hinge mount and rotating, and a thin plate extended on the back surface of the liquid crystal display device.

[ CLAIM 7 ]

The portable computer according to the claim 6, wherein

the hinge mount is fixed to the body case.

[ CLAIM 8 ]

The portable computer according to the claim 7, wherein

the first fastening portion is at least one fixing hole formed on the back surface of the display device, the second fastening portion is at least one through hole formed on the thin plate, the fixing hole and the through hole fastened by a screw.

[ CLAIM 9 ]

The portable computer according to the claim 6, wherein

the thin plates of the hinge arms are extended perpendicular to two opposite sides of the back surface of the flat panel display device.

[ CLAIM 10 ]

The portable computer according to the claim 9, wherein

the thin plate of the hinge arm further includes a horizontally extended portion from the perpendicularly extended portion.

[CLAIM 11]

The portable computer according to the claim 6, wherein

the hinge mount is fixed to a display device case.

[ CLAIM 12 ]

The portable computer according to the claim 11, wherein

the first fastening portion is at least one fixing hole formed on the back surface of the display device, the second fastening portion is at least one through hole formed on the thin plate, and each the fixing hole and the through hole having at least one internal screw, fastened by screws.

[ CLAIM 13 ]

The portable computer according to the claim 12, wherein

the thin plate of the hinge arm is extended perpendicular to two sides of the back surface of the flat panel display device.

[ CLAIM 14 ]

The portable computer according to the claim 13, wherein

the thin plate of the hinge arm further includes an horizontally extended portion from the perpendicularly extended portion.

[ CLAIM 15 ]

The portable computer according to the claim 4 or 5, wherein

The first fastening portion is a fastener, the second fastening portion is a through hole, and the third fastening portion is a fastener fixing hole.

[CLAIM 16]

A method of coupling a flat panel display device of a portable computer comprising:

preparing a body, the flat panel display device, a display device case and a hinge, the hinge including a hinge arm and a hinge mount and rotatively coupling a display device case with the flat panel display device;

mounting the hinge to rotatively couple the display device case with the body;

and coupling the hinge arm of the hinge on the back surface of the flat panel display device.

[CLAIM17]

The method of coupling the flat panel display device of the portable computer according to the claim 16, wherein

the flat panel display device is a liquid crystal display device.

[CLAIM 18]

The method of coupling the flat panel display device of the portable computer according to the claim 17, wherein

the hinge arm is formed integrally with a pin for rotation and a thin plate, the thin plate extended on the back surface of the liquid crystal display device.

[ CLAIM 19 ]

A method of coupling a flat panel display device of a portable computer comprising:

preparing a body case, the flat panel display device, a display device case and a hinge, the hinge including a hinge arm and a hinge mount and rotatively coupling the display device case with the body case;

mounting the hinge to rotatively couple the display device case with the body case;

coupling the hinge arm of the hinge on the back surface of the flat panel display device;

and coupling the hinge arm and/or the flat panel display device with the display device case.

[ CLAIM 20 ]

The method of coupling the flat panel display device of the portable computer according to the claim 19, wherein

the hinge arm includes a pin and a thin plate, the pin capable of rotating in the hinge mount, and the thin plate extended from the pin and parallel to an inner surface of the display device case.

[ CLAIM 21 ]

The method of coupling the flat panel display device of the portable computer according to the claim 19, wherein

the hinge mount is mounted on the body case.

[ CLAIM 22 ]

The method of coupling the flat panel display device of the portable computer according to the claim 20, wherein

the hinge mount is mounted on the body case.

[ CLAIM 23 ]

The method of coupling the flat panel display device of the portable computer according to the claim 19, 20, 21, and 22 wherein

the flat panel display device is a liquid crystal display device.

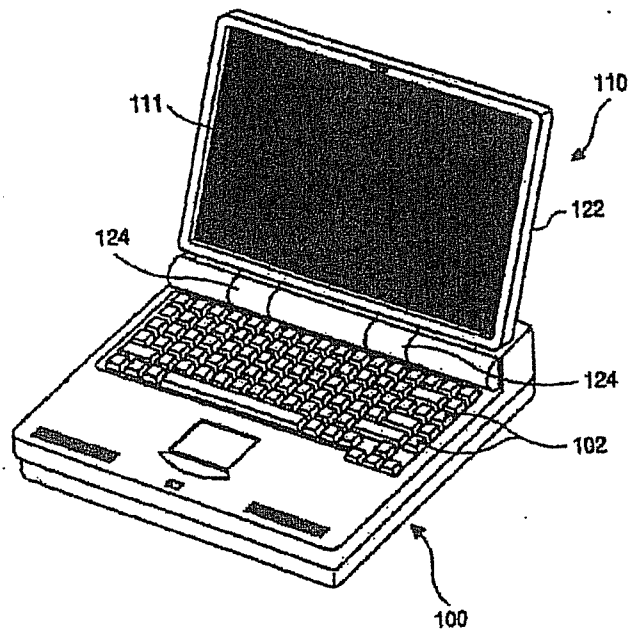
**[ CLAIM 24 ]**

**The method of coupling the flat panel display device of the portable computer according to the claim 19, 20, 21, and 22 wherein**

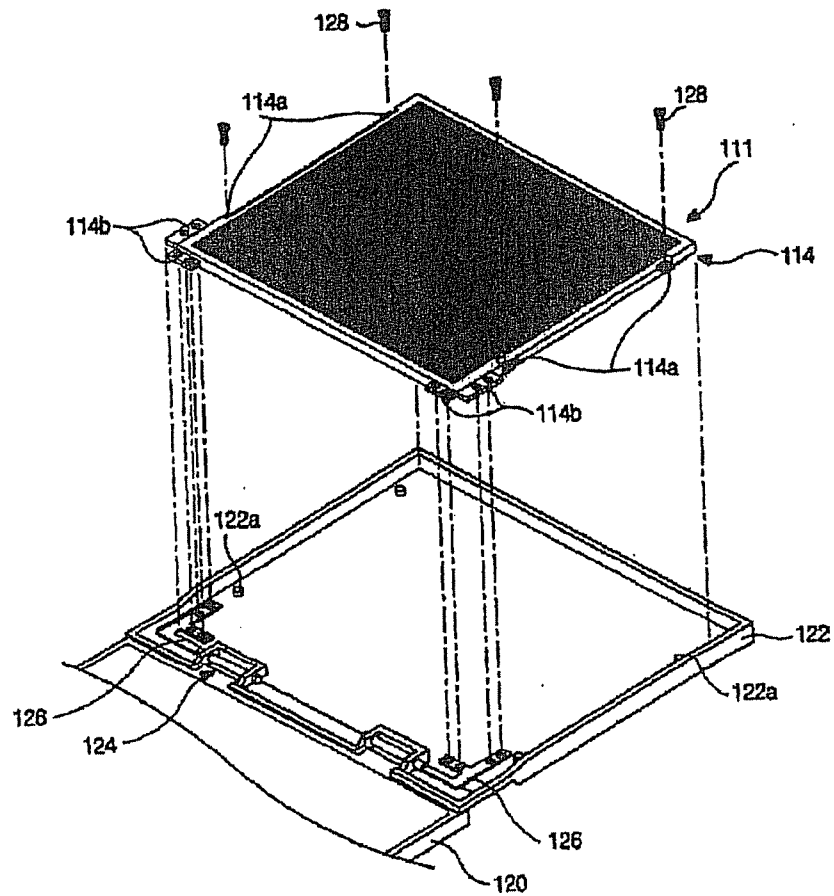
**the back surface of the flat panel display device, the hinge arm and the display device case are coupled at the same time.**



[FIG.1]

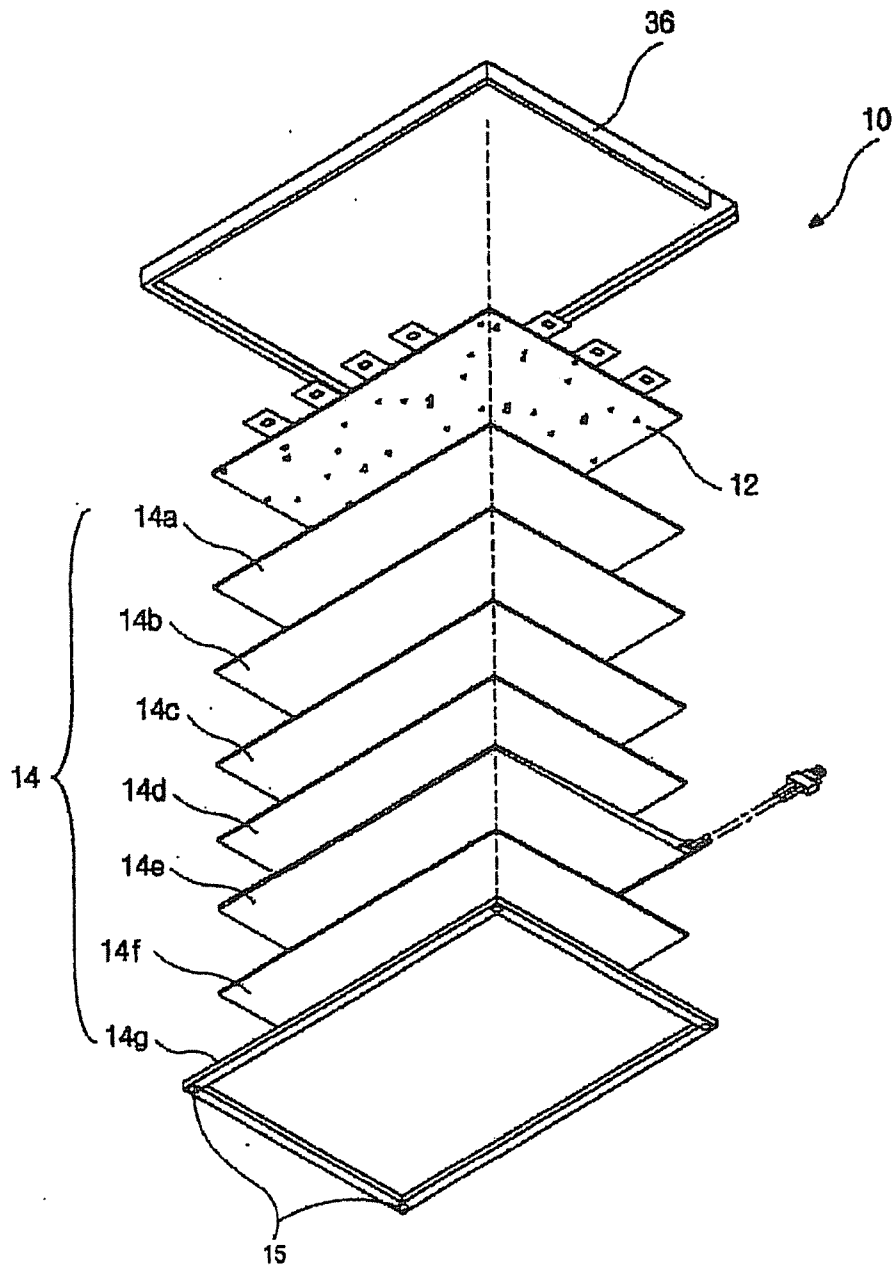


[FIG. 2A]

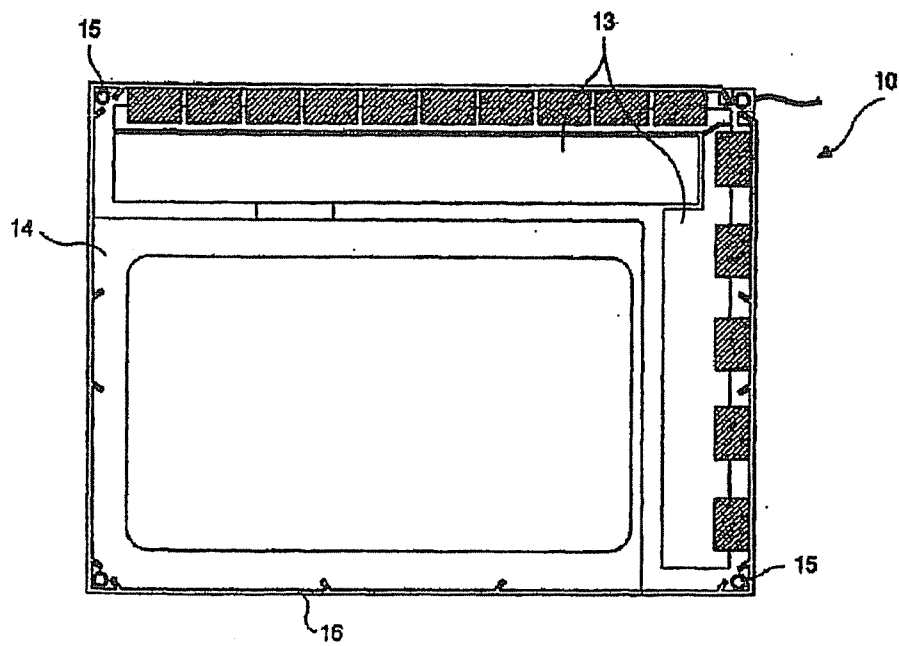


[illegible]

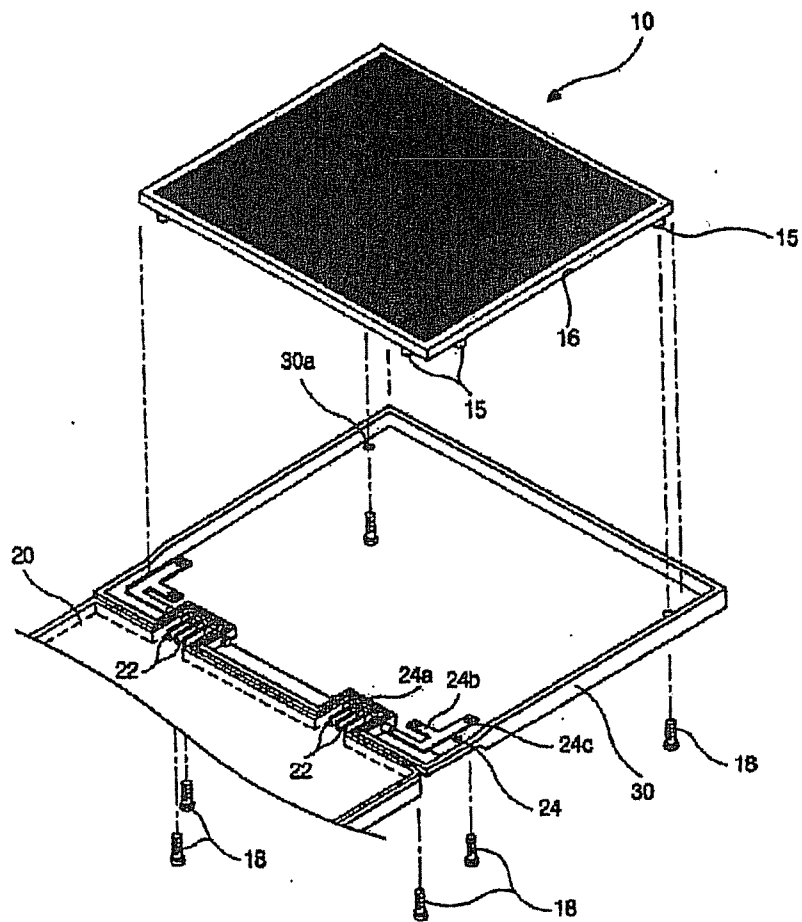
[FIG. 3A]



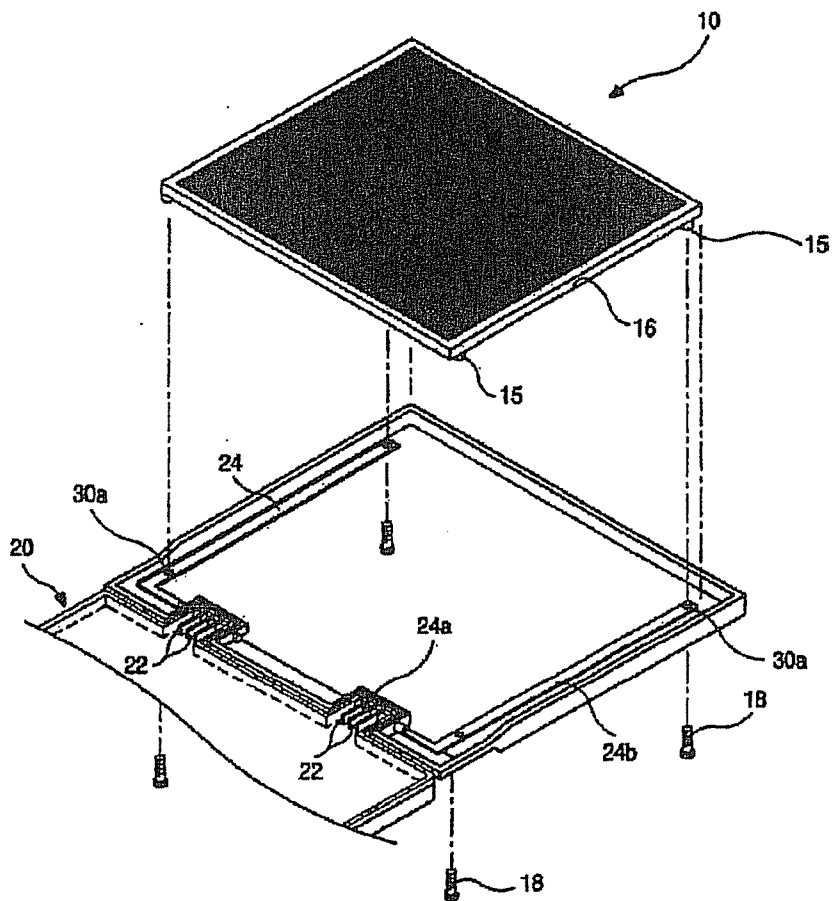
[FIG. 3B]



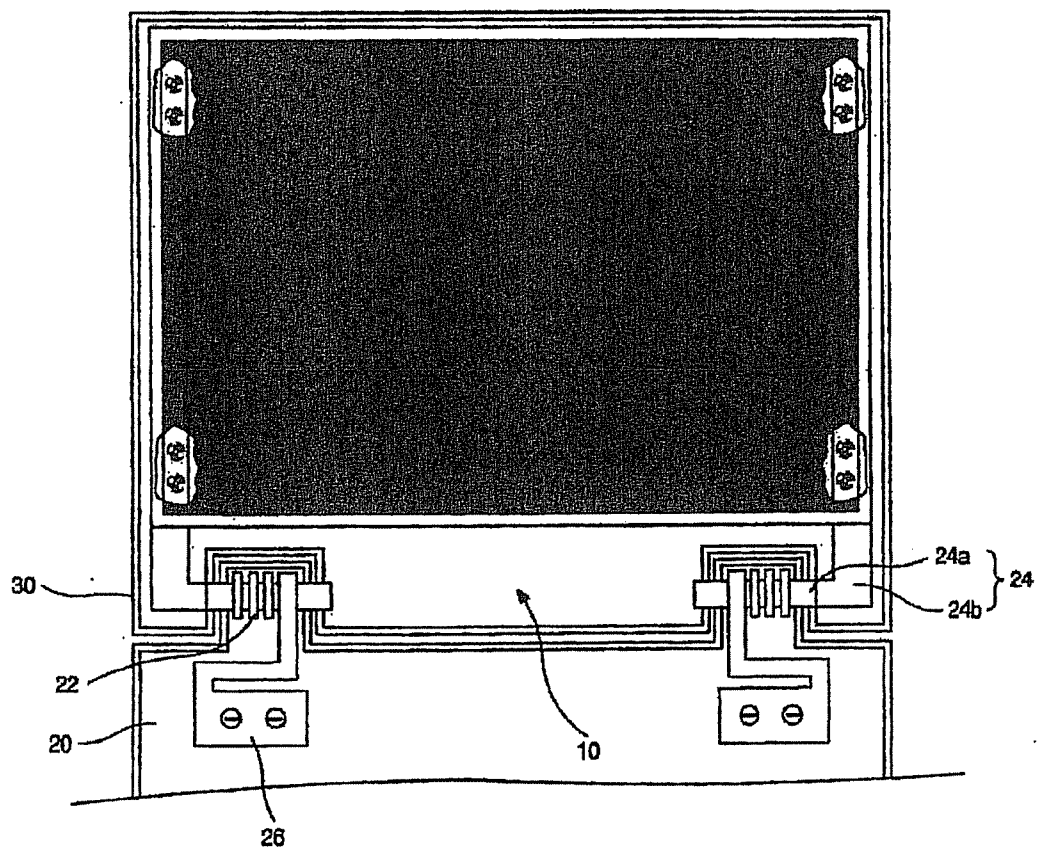
[FIG. 4]



[FIG.5]

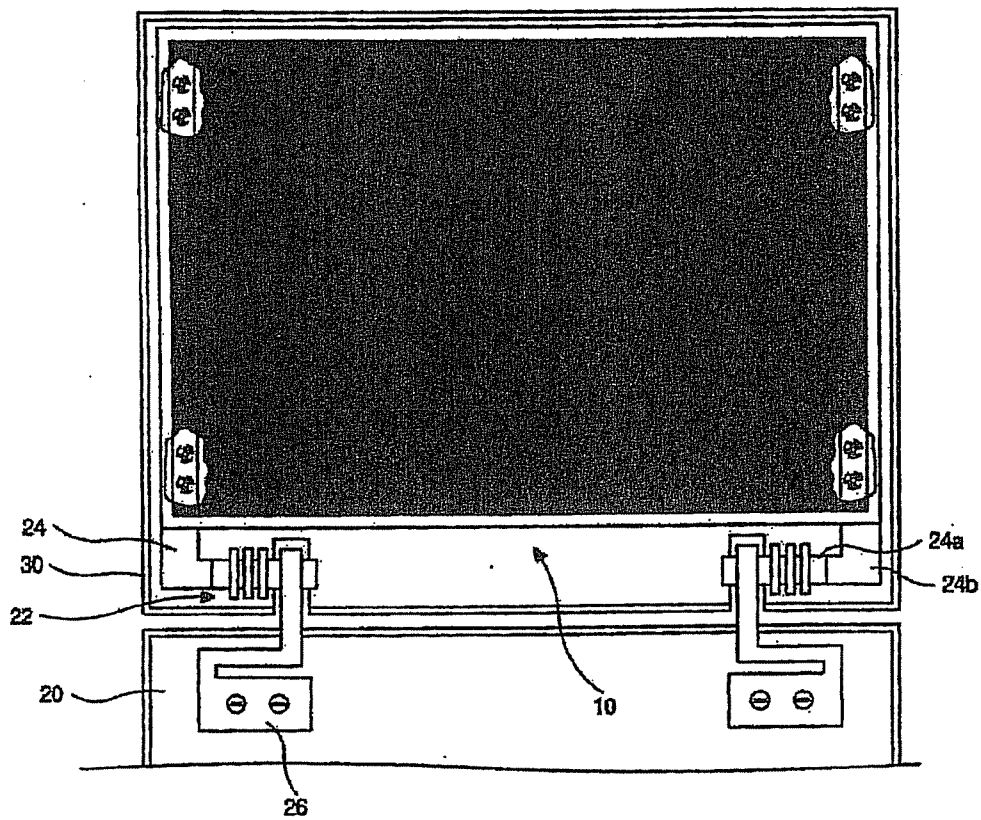


[FIG. 6]

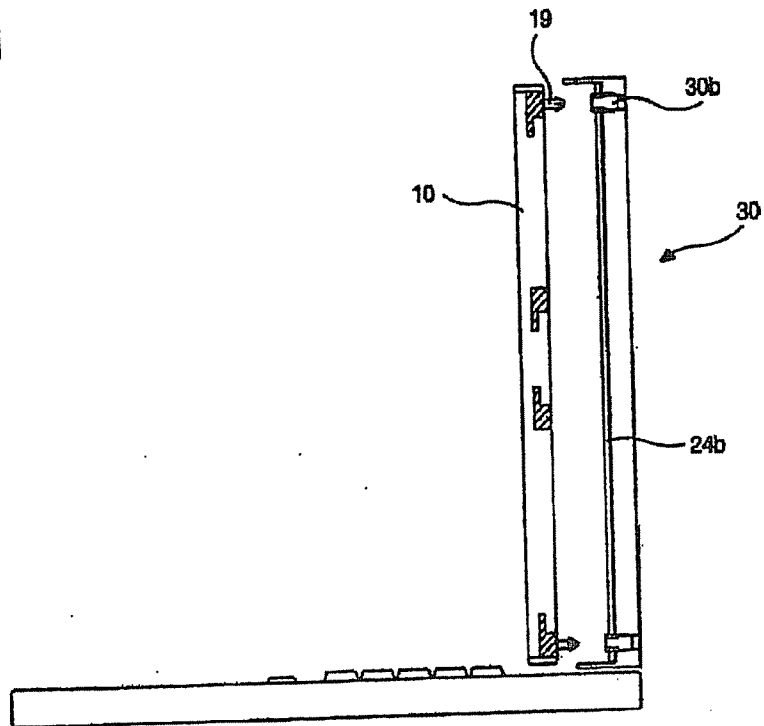




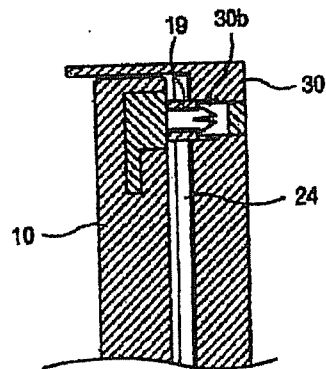
[FIG.7]



[FIG.8]



[FIG.9]



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